**Must-Knows: Unit 6 (Cell Division)**

Ms. Ottolini, AP Biology

**Test Format:** 34 multiple choice questions, 1 short answer question

***Directions:*** *To prepare for your upcoming test, please answer the following questions thoroughly and accurately on your answer sheet in the column titled “Your Answer Before Checking the Answer Key.” Then, check the answer key (posted on Ms. Ottolini’s wiki page). Finally, record any additions / changes to your answer in the column titled “Changes / Additions to Your Answer After Checking the Answer Key”*

**Topic #1: DNA and the Cell Cycle**

***Learning Target #1:***  I can explain how DNA is organized in prokaryotic vs. eukaryotic cells.

***Learning Target #2:***  I can identify and explain the steps of the cell cycle.

1. What events take place in the cell during interphase?
2. How does the amount of DNA in the cell change during the S stage of interphase?
3. How does the length of interphase change when the rate of cell division increases? How does the length of interphase change when the rate of cell division decreases?
4. What is the G0 stage? Why might a cell enter the G0 stage?
5. Describe the organization of DNA in a prokaryotic cell.
6. Describe the organization of DNA in a eukaryotic cell. Why do chromosomes in cells preparing for mitosis have two identical chromatids?
7. How is prokaryotic binary fission different from eukaryotic mitosis?

**Topic #2: Mitosis**

***Learning Target #3:***  I can identify the purposes of mitosis in unicellular vs. multicellular organisms.

***Learning Target #4:***  I can explain what happens in each step of mitosis.

1. In what stage of mitosis does the mitotic spindle form? In what stage does it break down?
2. Why is cytokinesis necessary after mitosis? If mitosis but not cytokinesis occurred in onion root tip cells, what would you expect to see on a slide of these root cells?
3. Why do scientists believe that centrosomes and not centrioles are responsible for mitotic spindle formation?
4. How is cytokinesis different in animal vs. plant cells?
5. What are the purposes of mitosis in multicellular organisms?
6. What is the difference between diploid (2n) and haploid (n) cells? Does mitosis create diploid or haploid daughter cells from a parent diploid cell?
7. What happens during anaphase?

**Topic #3: Meiosis**

***Learning Target #5:***  I can identify the purpose of meiosis.

***Learning Target #6:***  I can explain what happens in each step of meiosis.

1. How many daughter cells are created in meiosis? What types of cells (diploid or haploid) are these daughter cells?
2. When do synapsis and crossing over occur during meiosis? What is the purpose of this process?
3. Describe the differences between metaphase I and metaphase II of meiosis. See the images posted to the Wiki page for a visual.
4. Describe the differences between anaphase I and anaphase II of meiosis. See the images posted to the Wiki page for a visual.
5. How does the amount of DNA in a diploid cell that has just copied its DNA in preparation for meiosis compare to the amount of DNA in a haploid daughter cell at the end of meiosis II?
6. Why must gametes (eggs and sperm) be haploid cells?
7. How does meiosis increase genetic variation in a population? (Hint: there are three ways!!!)
8. Why do populations of organisms that use meiosis and sexual reproduction have an evolutionary advantage over populations of organisms that use asexual reproduction?

**Topic #4: Regulation of the Cell Cycle**

***Learning Target #7:***  I can describe the methods cells use to control the cell cycle.

***Learning Target #8:***  I can explain what happens when cell cycle controls fail (i.e. cancer).

1. How are cancer cells different from normal cells?
2. What is the difference between a benign and a malignant tumor?
3. What occurs at the M phase checkpoint?
4. Why do most cancer treatments target rapidly dividing cells?

***\*\*\*Note: On your test, there will be four “Science Skills” multiple choice questions. Though the questions are related to cell division data, you really only need to use critical thinking skills to find the answers.\*\*\****